

## REMARKS

The above amendments and these remarks are responsive to the Office action dated December 7, 2004. Claims 1-7 are pending in the application. Claims 1-7 are rejected. In particular, claims 1-7 are rejected under 35 U.S.C. § 112, second paragraph; claims 1, 2, 5, and 7 are rejected under 35 U.S.C. § 102(b); and claims 2, 3, 4, and 6 are rejected under 35 U.S.C. § 103(a).

Applicants have amended claim 1. In view of the above amendments and the following remarks, Applicants request reconsideration of the rejected claims.

### *Rejections under 35 U.S.C. § 112*

The Examiner has rejected claims 1-7 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that the Applicants regard as the invention. The Examiner indicates that the language of claims 1-7 is incomplete for omitting essential elements. In particular, the Examiner indicates that the structure and orientation of the elements that "deviate from the rotational axis" is unclear.

Applicants suggest that the subject matter of claim 1 would be clearly defined to one of ordinary skill in the art, particularly in view of the guidance of the specification. Nevertheless, in order to facilitate the prosecution of the application, Applicants have amended claim 1 to recite more particularly how the cutting blade of the claimed ball end mill deviates from the rotational axis. Support for the amendment may be found in the depiction of cutting edge 4B with respect to rotational axis 2a in Figs. 1A and 1C, and

generally in the specification, more particularly at page 5, lines 16-26; and at page 8, lines 28-31. Applicants suggest that the amendment serves to place the application in condition for allowance, or in the alternative, in better form for appeal, and therefore respectfully request that the amendment be entered.

Applicants suggest that, in view of the above amendments, claim 1 particularly and distinctly defines the claimed subject matter. Applicants therefore request the withdrawal of the rejection of claims 1-7 under 35 U.S.C. § 112, second paragraph.

### **Rejections under 35 USC § 102**

Claims 1, 2, 5, and 7 are rejected under 35 U.S.C. § 102(b) as being anticipated by DE 196 09 904 A1 (Ryoko Seiki Co.), hereafter referred to as DE '904. The Examiner suggests that the cited reference discloses all the of subject matter as set forth in the claims and is identical to the invention as broadly recited. Applicants respectfully disagree and traverse the rejection.

In the ball end mill of claim 1, as amended, a cutting blade intersects a tip end surface of the tool main body at a position which deviates from the rotational axis by a predetermined distance along a radial direction of the tool main body. The claimed ball end mill is distinct from the ball end mill of the DE '904 reference.

As discussed in their previous Amendment and Response, dated August 6, 2004, Applicants noted that the DE '904 reference describes a ball end mill with a disposable cutting tip located on plate 8, which is retained in a cutout 2 at the end of a tool main body 1. As shown in Figure 2 of DE '904, the cutting edge is centered on

plate 8, and plate 8 is inserted into the tool main body 1 so that the centerline of plate 8 agrees with the centerline of the tool main body, as shown in Figure 6 and described in line 65 of column 3 to line 5 of column 4 of the cited reference. The cutting blade on plate 8 does not deviate from the rotational axis of the tool.

In order for the DE '904 reference to anticipate claim 1, it must disclose each and every element of the amended claim. As the DE '904 reference fails to disclose a ball end mill having a cutting blade that intersects a tip end surface of the tool main body at a position which deviates from the rotational axis by a predetermined distance along a radial direction of the tool main body, the reference fails to anticipate the subject matter of claim 1.

Claims 2, 5, and 7 depend directly or indirectly from claim 1, and are not anticipated by DE '904 for at least the same reasons that claim 1 is not anticipated by the reference. Applicants therefore respectfully request that the rejection of claims 1, 2, 5, and 7 under 35 U.S.C. § 102(b) be withdrawn.

### **Rejections under 35 USC § 103**

Claims 2 and 6 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the DE '904 reference.

With respect to claim 2, the Examiner suggests it would have been obvious to one having ordinary skill in the art at the time of the invention to use the claimed predetermined distance, since it appears that it would not have a major effect on the efficiency and operation of the tool, and further since it has been held that where the

general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. Applicants respectfully disagree.

As discussed above, the DE '904 reference fails to disclose the subject matter of claim 1, as amended. Applicants therefore suggest that the DE '904 reference also fails to disclose each and every element of claim 2. With respect to the claimed predetermined distance, Applicants suggest that at as the cited reference fails to disclose any deviation of the cutting blade from the rotational axis, that the reference must therefore necessarily fail to provide a motivation to vary the predetermined distance, much less to provide a reasonable expectation that the particular distance recited in claim 2 would be an advantageous distance.

With respect to claim 6, the Examiner suggests it would have been obvious to use mirror polishing to round the blade since the use of such is old and well-known in the art. Again, Applicants suggest that as the DE '904 reference fails to disclose the subject matter of claim 1, as amended, the DE '904 reference necessarily fails to disclose each and every element of claim 2. In order to establish the *prima facie* obviousness of the rejected claims, the cited reference must disclose each and every element of the claims.

In view of the above amendments and remarks, Applicants suggest the Examiner has failed to establish the *prima facie* obviousness of the rejected claims, and therefore respectfully requests the withdrawal of the rejection of claims 2 and 6 under 35 U.S.C. § 103.

The Examiner has rejected claims 3 and 4 under 35 U.S.C. § 103(a) as being

unpatentable over DE '904 in view of Anjanappa et al. the Examiner suggests that it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the rake face and the flank face of the ball end mill of DE '904 with different predetermined angles in the manner as taught by Anjanappa et al. in order to provide the tool with a different cutting option. Applicants traverse the rejection.

In order to establish the *prima facie* obviousness of the rejected claims, the cited references must disclose each and every element of the claims. As discussed above, the DE '904 reference fails to disclose a ball end mill having a cutting blade that intersects a tip end surface of the tool main body at a position which deviates from the rotational axis by a predetermined distance along a radial direction of the tool main body.

The Anjanappa et al. reference discloses a cutting tool. However, the cutting edges of the tools of Anjanappa et al. (220 and 320, respectively) are not semi-circular, and fail to intersect the tip end surface of the cutting too at a position deviating from the rotational axis of the tool. In fact, as shown in Figures 12-15 and 17-20 of Anjanappa et al., the central portion (221 or 321) of the cutting blade (220 or 320) is precisely positioned along the central axis of the tool main body, and therefore the cutting blade intersects with the rotational axis of the tool main body.

Neither cited reference discloses a tool having a cutting blade at a position that deviates from the rotational axis of the tool, and therefore the references fail to disclose each and every element of the claim. Further, one of ordinary skill would not be led to combine the rake face and flank face of the Anjanappa et al. reference with a cutting edge

that is offset from the rotational axis of the tool, because to do so would be to change the principle of operation of the Anjanappa et al. reference. Specifically, the rake face and flank face occur on alternating edges of the cutting tool of Anjanappa et al. There can be no suggestion or motivation to modify Anjanappa et al. to create a tool having a cutting blade with a rake face and a flank on opposite sides of a single cutting blade, as to modify the cutting tool of Anjanappa et al. would also change the principle of operation of the reference. For at least these reasons, Applicants suggest the Examiner has failed to establish the *prima facie* obviousness of claim 1, and therefore of claims 3 and 4.

However, even if the Examiner had established the *prima facie* obviousness of the rejected claims, the holding of obviousness may be rebutted by consideration of the unexpected advantages exhibited by the claimed ball end mill, including a reduction in resonance during operation, improved workability of the tool, reduced manufacturing costs, reduced breakage of the cutting blade, and the ability to easily manufacture the desired cutting blade to high precision (see the specification at page 3, line 18 to page 4, line 16).

In view of the amendments and remarks above, Applicants respectfully request the withdrawal of the rejection of claims 3 and 4 under 35 U.S.C. § 103.

### ***References made of record***

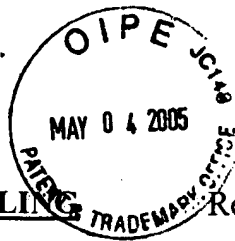
Applicants have previously provided an Information Disclosure Statement under 37 C.F.R. §§ 1.56, 1.97, and 1.98 dated March 29, 2004. However, the Applicants have not received an indication that the disclosed references have been considered.

Applicants hereby provide copies of the PTO-1449 form previously submitted, for the convenience of the Examiner, and respectfully request a confirmation that the disclosed references have been considered by the Office, and will be made of record in the above application.

On July 6, 2004, Applicants received a copy of Patent No. DE 19609904A1 referenced in the Office Action dated May 6, 2004. The DE '904 reference was not included on the provided form PTO-892, Notice of References. Applicants respectfully request that Patent No. DE 19609904A1 be made of record in the above application.

It is now believed that the subject patent application has been placed in condition for allowance, and such action is respectfully requested. If the Examiner has any questions or concerns, or if a telephone interview would in any way advance prosecution of the application, please contact the undersigned agent of record.

The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 11-1540.



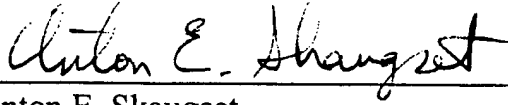
**CERTIFICATE OF MAILING**

Respectfully submitted,

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail, postage prepaid, to: Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450 on April 7, 2005.

  
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